

IAS Delta System/Preliminary Design Review

Agenda

- **Introduction** **J. Henegar**
- **System Architecture Overview** **T. Ulrich**
- **Operations Concept** **R. Whitman**
- **IAS Software Subsystem Design**
 - **Process Control Subsystem** **J. Garrahan**
 - **Data Management Subsystem** **J. Garrahan**
 - **Evaluation and Analysis Subsystem** **D. Kaufmann**
 - **Radiometric Processing Subsystem** **J. Rowe**
 - **Geometric Processing Subsystem** **J. Storey**
 - **End-to-End Scenario** **J. Garrahan**
- **IAS Hardware Architecture** **D. Slater**
- **Wrap-up**

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	IAS Purpose	

- **Assess the quality of a small sample of the Level 0R data archived by the EROS Data Center (EDC) Distributed Active Archive Center (DAAC)**
- **Calibrate the on-orbit radiometry and geometry of the Landsat-7 Enhanced Thematic Mapper + (ETM+) instrument and satellite**
- **Provide the resulting correction and registration parameters to the DAAC for generation of Level 1 products, for distribution to users ordering Level 0R ETM+ data, or in response to user requests for the parameters**

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	IAS Key Requirements (1 of 2)	

- Radiometrically correct and geometrically register Level 0R ETM+ data to create Level 1 digital image data (up to 10 Level 1G scenes per day)
- Calibrate the radiometric response (absolute radiometric radiance) of each ETM+ detector to 5%, 1 sigma
- Calibrate the radiometric response of each ETM+ detector using IC, PASC, FASC, and GLC data
- Perform geometric modeling and resampling to create a systematically-corrected image with a geodetic accuracy of 250m, 1 sigma
- Provide the capability to generate precision-corrected and terrain-corrected images

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	IAS Key Requirements (2 of 2)	

- **Maintain and distribute the Landsat-7 Calibration Parameter File**
- **Perform data quality and ETM+ instrument performance assessments and evaluations. Generate and distribute associated reports**
- **Provide capabilities to support anomaly assessments, resolution, and reporting**

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	IAS Design Constraints	

- **COTS, NDI, and prototype products shall be used to the maximum extent possible in order to minimize schedule risk**
- **Oracle shall be used as the IAS RDBMS**
- **C shall be the primary programming language**
- **IDL shall be used to provide Evaluation and Analysis subsystem functionality, including at least part of the user interface**
- **An SGI computer shall be used as the target processor for the IAS Operations System**
- **The IAS shall be designed for maximum reuse by LPGS**

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	IAS Design Assumptions (1 of 2)	

- **The geometry and radiometry subsystems will be designed for direct plugging into the IAS infrastructure.**
- **Algorithms are defined to assure that radiometric and geometric performance requirements are satisfied.**
- **There are no algorithms that are interactive - i.e., requiring operator or analyst intervention.**
- **Standard radiometric and geometric processing strings executed using the Work Order mechanism can be suspended for user intervention using IAS-defined mechanisms.**
- **Radiometric algorithms operate on one band of image data at a time. No radiometric algorithms require multi-band or -image input.**

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IAS Design Assumptions (2 of 2)

- **The Evaluation and Analysis subsystem will provide “generic” image processing applications (i.e., not unique to Landsat-7) as well as the capability to display and edit IAS system inputs, intermediate files, and outputs.**
- **Landsat-7 unique applications for radiometric or geometric assessment and evaluation will be provided by the associated subsystem. IAS shall provide a mechanism for executing these applications.**
- **APIs will be provided for algorithm interfaces with the Oracle database and for retrieving and writing image and other HDF-formatted files.**

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	Issues (1 of 2)	

- **Definition and baselining of all radiometric and geometric algorithms to be accommodated within the IAS. This includes completion of ATBDs and Calibration Plans**
- **Definition and baselining of the content and format of the Calibration Parameter File**
- **Definition of required IAS error handling capabilities, including identification of Level 1 and Calibration error conditions, associated level of severity, and action to be taken (automated or manual)**
- **Definition of process for generating the Calibration Parameter File**
- **Impacts of planned reuse for LPGS**

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Issues (2 of 2)

- **Baselining of ECS interface**
 - **Push vs pull model**
 - **Level 0R Product searchable metadata fields**
- **Definition of the MMO interface**
- **Determination of whether interpolated Concentrated Ephemeris (vs. propagated ephem) is sufficient for IAS processing, thereby eliminating part of the MOC interface**
- **Analysis of impacts resulting from selection of SGI Origin 2000 as IAS Operations System**
 - **Field performance experience**
 - **Availability of development and analysis tools**

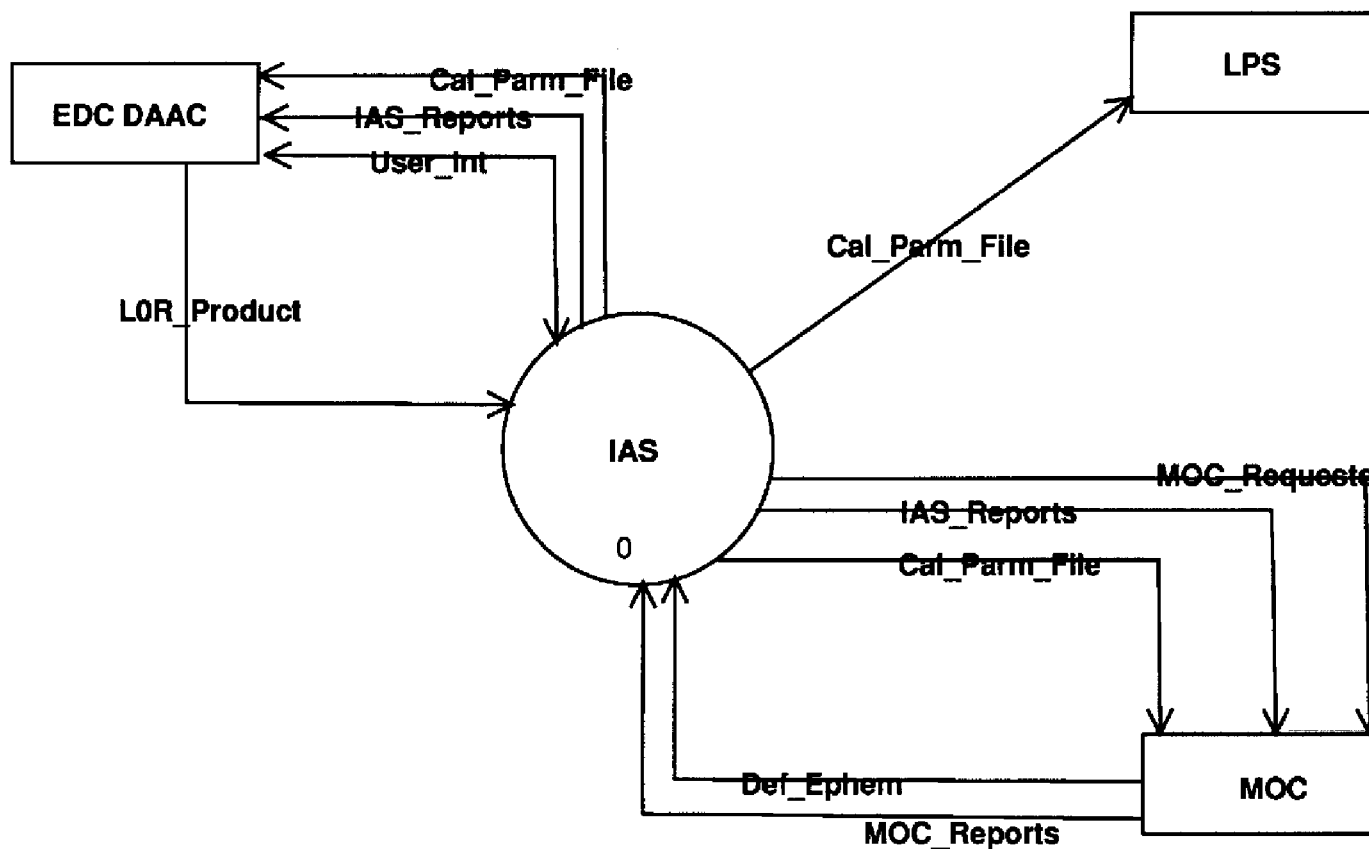
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	IAS Requirements Sources	

- **Landsat-7 Image Assessment System (IAS) Element Specification**
- **Landsat 7 OR Distribution Product Data Format Control Book HDF Version**
- **Landsat 7 Calibration Parameter File Definition.**
- **Landsat 7 System Specification**
- **Interface Control Document Between EOSDIS Core System (ECS) and the Landsat 7 System**
- **Landsat-7 Mission Operations Center (MOC) to Image Assessment System (IAS) Interface Control Document (ICD)**
- **Interface Control Document (ICD) Between the Image Assessment System (IAS) and the Landsat-7 Processing System (LPS)**

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IAS System Context Diagram

Context-Diagram;1
Image Assessment System



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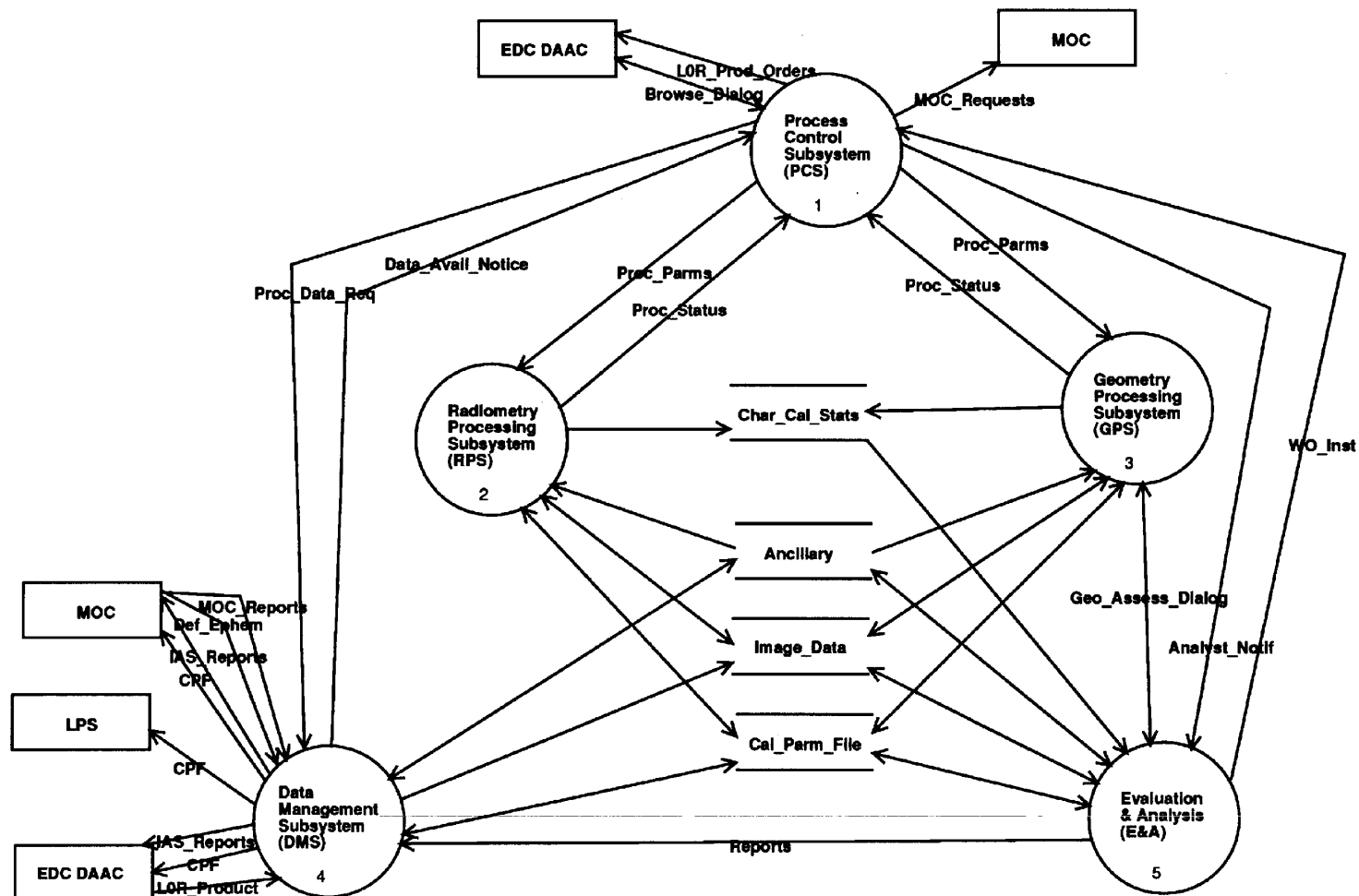
IAS External Interfaces

Interface Name	Interface Element	Transfer Mechanism
IAS to EDC DAAC	Browse Search Parameters	Uses Web Browser.
	Calibration Parameter File	ftp "put" by IAS. Requires use of ECS Ingest GUI client.
	Reports	Not well specified in the ICD. Assume ftp "put" by IAS using ECS Ingest GUI client.
EDC DAAC to IAS	Browse Search Results	Uses Web Browser.
	OR Data Product	ftp "get" by IAS from location specified in Data Availability Notice.
IAS to LPS	Calibration Parameter File	ftp "get" by LPS from designated standard IAS directory.
IAS to MOC	Calibration Scene Requests	ftp "put" by IAS into designated MOC directory.
	Calibration Parameter File	ftp "put" by IAS into designated MOC directory.
	Reports	ftp "put" by IAS into designated MOC directory.
MOC to IAS	Event Schedules	ftp "put" by MOC into designated IAS directory.
	Spacecraft Status Reports	ftp "put" by MOC into designated IAS directory.
	Definitive Ephemeris	ftp "put" by MOC into designated IAS directory.

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IAS Level 0 Data Flow Diagram

0:7
IAS



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	IAS Subsystem Definitions (1 of 2)	

- **Process Control Subsystem (PCS)**
 - Provides the tools needed by the IAS Operator to plan and manage the processing being performed by the IAS
 - Controls the execution of Radiometric and Geometric Processing Subsystem applications by initiating and managing Work Order processing
- **Data Management Subsystem (DMS)**
 - Manages ingest and storage of data from external systems
 - Performs quality checking, correction, and subsetting of LOR Products
 - Manages IAS on-line data storage and archival
 - Formats IAS outputs for, and manages data transfer to, external systems

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IAS Subsystem Definitions (2 of 2)

- **Evaluation and Analysis Subsystem (E&A)**
 - Provides the Toolkit used by the IAS Analyst in evaluating and analyzing the performance of the ETM+ instrument and in maintaining the Calibration Parameter File
 - Includes tools for viewing IAS inputs and results, image processing, statistical analysis, and report generation
- **Radiometric Processing Subsystem (RPS)**
 - Provides all functionality required for Level 1R product generation, radiometric calibration, and radiometric characterization and evaluation
- **Geometric Processing Subsystem (GPS)**
 - Provides all functionality required for Level 1G product generation, geometric calibration, and geometric characterization and evaluation